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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/073,266	02/13/2002	Scott V. Thomsen	3691-367	6813

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EXAMINER	
ROSSI, JESSICA	
ART UNIT	**PAPER NUMBER**
1733	

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/073,266	THOMSEN ET AL.
	Examiner	Art Unit
	Jessica L. Rossi	1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 5/23/05, Amendment.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-6 and 8-15 is/are pending in the application.

4a) Of the above claim(s) 3 is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) 1-2,4-6,8-15 is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: ____.

DETAILED ACTION

Response to Amendment

1. This action is in response to the amendment dated 5/23/05. Claims 1-6 and 8-15 are pending but claim 3 remains withdrawn from further consideration.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-2, 4-6 and 8-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Medwick et al. (US 2002/0176988; of record) in view of Krisko (US 6060178; of record) and Veerasamy (WO 00/66506; of record), as set forth in paragraph 5 of the previous action.

**It is noted the present invention is directed to providing a protective layer, such as diamond-like carbon (DLC), over a solar coating that is applied to a glass substrate. The DLC layer protects the coating from <u>scratches during shipping/transporting/handling</u> of the substrate. The DLC coating is removed from the substrate during a heating step, which takes place before the substrate is assembled with another substrate to form an article, such as an IG window. (p. 1, [0001]; p. 7; [0028])*

With respect to claim 1, Medwick is directed to a method of making a window unit (p. 7, [0054]) wherein a temporary protective layer is placed over a solar/low-e coating on a glass substrate to protect the coating from *<u>scratches during shipping/handling</u>* of the substrate (abstract; p. 1, [0002] and [0005]).

The reference teaches providing a multi-layer solar/low-e coating 14 comprising Ag (p. 2, [0011], p. 3, [0024-0026]) on a glass substrate 12 (p. 3, [0023]), depositing at least one

temporary protective layer 16 comprising carbon directly onto the coating 14 (Figure 2; p. 7, [0055]), and heat treating the substrate with the coating and protective layer thereon at a temperature of at least 570°C so that the protective layer burns off thereby exposing the coating 14 (p. 7, [0053]; p. 8, [0057]). The reference teaches incorporating the glass substrate into an IG (insulating glass) unit after this heating step (p. 7, [0054]), wherein the skilled artisan would have appreciated that coupling of the glass substrate of Medwick to another substrate would have to take place in order to form the IG unit, since IG window units comprise at least two glass panes coupled to each other via a spacer(s) with their interior space evacuated and/or filled with a gas (note p. 1-2, [0003], of present specification).

The reference is silent as to an uppermost layer of the multi-layer solar/low-e coating 14 comprising silicon nitride, the carbon in the protective layer being diamond-like-carbon (DLC), and using a gas comprising a hydrocarbon to ion beam deposit the DLC.

It is know in the art to provide a solar/low-e coating on the surface of a glass substrate of an IG unit wherein the coating comprises multiple layers with at least one of the layers comprising Ag and an uppermost layer of the coating comprising silicon nitride, as taught by Krisko (abstract; Figure 3; column 1, lines 10-15 and 25-27; column 3, lines 1-8; column 7, lines 15-40). Krisko teaches it being desirable to have the uppermost layer of the coating comprise silicon nitride because it is highly transmissive of visible light while also imparting chemical and physical durability to the coating (column 5, lines 30-40).

The skilled artisan reading Medwick as a whole would have appreciated that the layers comprising the solar/low-e coating 14 are not critical to the invention (sections [0025-0026]) and therefore would have been motivated to use a multi-layer solar/low-e coating having an

uppermost layer comprising silicon nitride because such is known in the art, as taught by Krisko, wherein silicon nitride is highly transmissive of visible light while also imparting chemical and physical durability to the coating .

It is known in the art to provide a DLC layer 3 directly on top of a multi-layer solar/low-e coating 5, which comprises an Ag layer and an uppermost silicon nitride layer (p. 14, lines 10-18 – especially note US 5800933 incorporated by reference), on a glass substrate 1 where the DLC layer *protects the coating and substrate from scratches* during *shipping/handling*, as taught by Veerasamy (Figure 3; p. 10, lines 16-21; p. 18, lines 10-18; p. 21, line 5). Veerasamy also teaches using the DLC layer to repel dirt and make the coated glass substrate less susceptible to visible corrosion on its surfaces, once the substrate has been heated and then assembled with another substrate to form an article, such as an IG window unit (p. 18, lines 10-18; p. 37, lines 11-15).

Veerasamy acknowledges that the DLC layer is capable of being burned off during this heating step (p. 37, lines 16-20), and therefore provides a temporary non-porous tungsten disulfide layer over the DLC layer to prevent the same from burning off (p. 38, line 1) in order to achieve the additional benefits of repelling dirt and preventing corrosion once the coated glass substrate has been incorporated into a window unit.

One reading Veerasamy as a whole would have appreciated that the only reason for preventing burn-off the DLC layer is to achieve the **additional benefits** of repelling dirt and decreased susceptibility to corrosion, once the coated substrate has been incorporated into a window unit – something **Medwick is NOT concerned with** (note Medwick only concerned with preventing damage to functional coating during shipping/handling of coated glass substrate

and therefore teaches removing carbon coating during heating step, which takes place before incorporating the substrate into window unit).

Therefore, the skilled artisan at the time the invention was made would have been motivated to use DLC for the carbon protective layer of Medwick solely for achieving scratch prevention during shipping/handling, as desired by Medwick, because such a carbon layer is known in the art for protecting a coated glass substrate from scratching during shipping/handling, as taught by Veerasamy, wherein such a layer would provide the temporary protection during shipping/handling as desired by Medwick while also allowing for its removal during the heating step, as desired by Medwick.

The skilled artisan would have been further motivated to use DLC for the carbon protective layer of Medwick, which is deposited directly on top of the silicon nitride layer comprising the solar/low-e coating of Medwick in view of Krisko, given the fact that Veerasamy teaches depositing the DLC protective layer directly on top of the silicon nitride layer comprising the solar/low-e coating (p. 14, lines 10-18 – especially note US 5800933 incorporated by reference).

As for a method of depositing the DLC layer, Medwick teaches that any conventional technique can be used (p. 7, [0055], lines 14-18). Therefore, it would have been obvious to deposit the DLC protective layer onto the uppermost silicon nitride layer of the solar/low-e of Medwick in view of Krisko using **ion beam deposition using a hydrocarbon gas** because such is know in the art, as taught by Veerasamy (p. 27, lines 8-12; p. 31, lines 20-22), where this is an effective way to deposit such a layer.

Regarding claim 2, Medwick teaches an IG window unit (p. 7, [0054]).

Regarding claim 4, Medwick teaches heating to at least 570°C (p. 7, [0053]; p. 8, [0057]).

Regarding claim 5, Medwick teaches heating the glass substrate from about 648-704°C to thermally temper the same (p. 7, [0053], p. 8, [0057]). As for the remaining portions of Applicant's claimed range, such would have been obvious to the skilled artisan at the time the invention was made given the closeness of these remaining portions to that taught by Medwick wherein only the expected results would have been achieved. As for a specific heating time, such would have been within purview of the skilled artisan at the time the invention was made depending on the materials used; it being noted that Medwick in view of Veerasamy and the present invention both teach heating a glass substrate having a solar coating and DLC layer thereon at similar temperatures to temper the same.

Regarding claim 6, Medwick teaches burning off the protective coating entirely (p. 7, [0053], p. 8, [0054]).

Regarding claims 8-9, Veerasamy teaches the DLC having an average hardness of at least 30 GPa (p. 22, lines 9-15).

Regarding claim 10, Veerasamy teaches the DLC including more sp3 carbon-carbon bonds than sp2 (p. 7, lines 6-16).

Regarding claim 11, Medwick teaches the solar/low-e coating comprising multiple reflective layers and multiple dielectric layers (p. 3, [0026]) but is silent as to a second Ag layer spaced from the first Ag layer with at least one dielectric layer between them. It would have been obvious to use such a construction for the solar/low-e coating of Medwick because such is known in the art, as taught by Krisko (teaches Ag layers 42, 44 and dielectric layers 52, 54 and

64; Figure 3; column 7, lines 15-40), wherein such a "double-stack" solar/low-e coating imparts desirable insulating properties to the window unit.

Regarding claim 12, Krisko teaches the dielectric layer 64 comprising silicon nitride (Figure 3; column 26-31).

Regarding claim 13, it is noted all these limitations were addressed above with respect to claims 1 and 4, except the Ag layer being IR reflecting. Medwick teaches such (section [0026]).

Regarding claim 14, this limitation was addressed above with respect to claim 2.

Regarding claim 15, Medwick teaches the solar/low-e coating 14 comprising at least one Ag layer and at least first and second dielectric layers on opposite sides of the Ag layer (p. 3, [0026] – p. 4, [0026]).

Response to Arguments

4. Applicant's arguments filed 12/27/04 have been fully considered but they are not persuasive.

5. On page 7 of the arguments, Applicant argues that Medwick teaches applying the protective carbon layer over a coating whose upper layer is an oxide and therefore not a silicon nitride as called for in claim 1; note Applicant is referring to the "coating" discussed in section [0056] of Medwick.

The examiner points out that the "coating" referred to by Applicant in section [0056] of Medwick is an **optional** blocking layer 18 that can but need not be located between the solar/low-e coating 14 and carbon protective layer 16. In rejecting the present claims, the examiner only relied upon the embodiment shown in Figure 2 of Medwick where the blocking

layer is **not** located between the solar/low-e coating 14 and the carbon protective layer 16 and therefore the carbon protective layer directly contacts the solar/low-e coating.

Even if Applicant is referring to solar/low-e coating 14 and not blocking layer 18, the examiner invites Applicant to reread the rejection of claim 1 above where ample motivation was provided by the collective teachings of Krisko and Veerasamy to use a solar/low-e coating having an uppermost silicon nitride layer for that of Medwick. As set forth in the last paragraph on p. 3 of the present action, Medwick is not concerned with a particular solar/low-e coating or the layers comprising it, as evidenced by the text in sections [0025-0026]; it being noted that Medwick does not say anything about the uppermost layer being an oxide, as asserted by Applicant. However, even if the solar/low-e coating of Medwick were to include an oxide layer it is noted that the solar/low-e coating of Krisko also comprises an oxide layer in addition to the Ag layer and the uppermost silicon nitride layer (column 3, lines 1-8).

6. On pages 7-8 of the arguments, Applicant argues that by using ion beam deposition with a gas comprising hydrocarbon in combination with a coating whose uppermost layer comprises silicon nitride, the inventors have found that much less damage is done to the underlying coating when DLC is deposited so as to contact the silicon nitride. Applicant further argues that the DLC can be deposited in a more efficient manner directly onto the coating with no need for a blocking layer that is needed by Medwick.

First, the examiner once again points out that the blocking layer is an **optional** layer wherein the examiner only relied upon the embodiment shown in Figure 2 of Medwick where the blocking layer is not located between the solar/low-e coating 14 and the carbon protective layer 16.

Second, the examiner invites Applicant to reread the rejection of claim 1 above where ample motivation was provided to use a solar/low-e coating having an uppermost silicon nitride layer and DLC for the carbon protective layer for that of Medwick where the DLC is ion beam deposited with a gas comprising hydrocarbon directly onto the silicon nitride layer based on the collective teachings of Krisko and Veerasamy.

7. On page 8 of the arguments, Applicant argues that Veerasamy teaches away from the invention of claim 1 because the goal of the reference is to prevent the DLC from burning off by using a tungsten layer on top of the DLC layer. Therefore, Applicant argues that the skilled artisan would not combine the teachings of Medwick and Veerasamy

As clearly set forth in the rejection of claim 1 above, Veerasamy teaches the DLC layer protecting the functional coating from scratching during shipping/handling. Veerasamy also acknowledges that the DLC layer is capable of being removed during heating of the glass substrate and the only reason the reference prevents this from happening is to achieve the additional benefits of repelling dirt and preventing corrosion once the coated glass substrate is incorporated into a window unit.

On the other hand, Medwick is not concerned with protecting the functional coating once shipping/handling is done and therefore teaches removing the protective carbon coating during the heating step, which takes place before the substrate is incorporated into a window unit. Furthermore, Medwick is not concerned with repelling dirt and preventing corrosion – the only reason Veerasamy prevents the DLC from burning off during the heating step.

Since Medwick is **only** concerned with using the carbon coating to protect the coated glass substrate during shipping/handling thereof, which takes place before heating the coated

glass substrate and then incorporating the same into a window unit, the skilled artisan would have been motivated to use DLC for the carbon protective layer of Medwick because such a layer would provide temporary protection during shipping/handling as desired by Medwick while also allowing for its removal during the heating step, as desired by Medwick.

8. On page 8 of the arguments, Applicant argues that Krisko is unrelated to the invention of claim 1 and there is nothing in the reference that discloses or suggests the use of ion beam deposition for DLC to directly contact a layer comprising silicon nitride, with a gas comprising a hydrocarbon, so that the DLC can be removed for exposing at least a part of a layer comprising silicon nitride.

The examiner points out that Krisko was only used to show it being known in the art to provide a solar/low-e coating on the surface of a glass substrate of an IG unit where the coating comprises multiple layers with at least one of the layers comprising Ag and an uppermost layer of the coating comprising silicon nitride wherein the reference teaches it being desirable to have the uppermost layer of the coating comprise silicon nitride because it is highly transmissive of visible light while also imparting chemical and physical durability to the coating.

The examiner would like to point out that Veerasamy was mainly relied upon for ion beam depositing a DLC protective layer directly on top of a solar/low-e coating on a glass substrate using a hydrocarbon gas where the DLC layer is capable of being removed during heating. However, and as pointed out in the 3rd paragraph on p. 5 of the present action, Veerasamy teaches the solar/low-e coating comprising an uppermost silicon nitride layer. Therefore, based on the teachings of Veerasamy, the skilled artisan would have appreciated it being known in the art to use ion beam deposition with a gas comprising a hydrocarbon to

deposit DLC directly onto a layer comprising silicon nitride where the DLC is capable of being removed for exposing at least a part of the layer comprising silicon nitride.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Jessica L. Rossi** whose telephone number is **571-272-1223**. The examiner can normally be reached on M-F (8:00-5:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine R. Copenheaver can be reached on 571-272-1156. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jessica L. Rossi

Jessica L. Rossi
Primary Examiner
Art Unit 1733